

# Sufficiency of Open Public and Green Spaces in Khartoum State-Sudan

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## ABSTRACT

*Green spaces are being recently used to adapt cities to climate change impacts. Khartoum State is like many others major cities around the world; it has increasing population and facing serious climate change impacts at the same time. This study is aiming to assess availability of open public and green spaces in Khartoum State as a possible tool to increase city's resilience to cope with the increasing rise of temperature as one of the climate change impacts Khartoum State is facing. This study has followed qualitative research method which has included; analysis of documents, photo documentation, observation, and secondary statistical data. The results revealed that; there is a severe lack of green spaces per capita in Khartoum State according to index of sufficiency of urban green space.*

**Keywords:** *Green spaces, Aesthetic and environmental value, Khartoum State, Urban zones.*

## 1. INTRODUCTION

Aesthetic and environmental value of greenery helps improve psychological, creativity and outdoor activities of city dwellers as well as it improves environmental quality and micro-climate of the surroundings. Green inclusion in urban centers may promote environment friendly activities such as bicycling; which's help reduce the community members' carbon footprints and subsequently reduce Green House Gas emissions. Thus, green spaces are now being considered to be one of the tools to adapt cities to the expected climate change impacts. Gardens and parklands have particularly valuable characteristics that suit them to play a key role. They represent the lungs of large cities. They contribute in reducing temperatures throughout urban zones, especially in summer (Makhelouf, 2008). According to European commission study (2013), even small green spaces in cities can have a valuable cooling effect that may extend for some distance beyond the park –200 meters in this study, and several

hundred meters in another study of a 3 hectare garden in Japan, the same study has concluded.

Khartoum State is capital of Sudan, its located in central Sudan at the confluence of the Blue and White Niles at 15°26' and 15°45' N and longitudes 32°25' and 32°40' E, at an altitude of 405.6 m above sea level (Eltayeb, 2003). It extends approximately over an area of 22,000 Km<sup>2</sup> (Fig.1). It embraces the three towns of Khartoum, Omdurman and Khartoum North (Known also as Bahari) (Osman, 1996). It has minimum temperature in winter ranging between 8°C and 10°C which falls to 5°C during night, and maximum temperatures varying from 23°C to 25°C, and a relative humidity which may sometime be as low as 20 per cent. However, in summer the temperature may exceed 45°C especially during May. The unpleasantness of heat during the summer is exacerbated by the occurrence of dust-storms-*haboobs*, the minimization of these two main factors of heat and dust constitutes as a major planning and design challenge of the human habitat (Osman, 1996). Khartoum state hosts a population of 5,274,321 capita distributed into 894,188 household (Fifth National Population and houses Census). Climate change scenario for Sudan indicates that the whole country-including Khartoum State may face a rise in temperature of between 1.5°C - 3.1°C during summer and 1.1°C to 2.1°C during cold season with reduced rain fall by 6mm during rainy season, all these change are expected to happen by 2060. According to many scholars, these expected changes may undermine the developmental progress achieved in many sectors and also pose more pressures on the fragile natural system.

## 2. AIM AND OBJECTIVES

This paper is mainly aiming to assess the availability of green and open spaces in Khartoum State-Sudan. Through literature review of governmental documents, reports, periodicals and scientific research literature; this paper seeks also to shade the light on green and open spaces as a

possible tool to adapt Khartoum State to the expected climate change impacts.



Fig.1: Study area

### 3. METHODOLOGY

In 2009, Holbrook has listed a wide range of study methodologies for collecting data pertaining to the study of open green spaces in urban centers. This list of research methodologies has included the following:

1. Survey/questionnaire.
2. Individual interview.
3. Other method.
4. Observation and photo documentation.
5. Secondary statistical data.
6. Group or focus group interview.
7. Controlled experiment.
8. Journal/diary.
9. Other experiments.
10. Document analysis

However, the most frequently used research methods in this regard are survey/questionnaire, followed by interviews and observation. Use of experiments as a methodology was rarely stated as a used method in this regard (Holbrook, 2009). In this study, the methodologies followed were analysis of documents, photo documentation, observation, and secondary statistical data.

From literatures reviewed, it can be concluded that there are many classification methods of urban green and open spaces based on various parameters. Some of these classifications tend to simplicity and generalization while others incline towards detailing and specifications. An example of simplicity classification is what mentioned in a study by Bell et al., in 2007; whereas, green spaces in United Kingdom have been divided into parks and gardens (private and public), natural and semi-natural green space, green corridors, outdoor sports facilities, and amenity green spaces (not including gardens) (Holbrook, 2009). Swanwick et al., in 2003 have produced detail full typology of urban green space comprising four main classes which are; amenity green space, functional green space, semi-natural habitats, and linear green space.

### 4. RESULTS AND DISCUSSIONS

Adopting Swanwick et al. (2003), classification as theoretical framework to analyze collected data for this study, open and green spaces in Khartoum State have been classified into four main classes based on parameters of number of population served and zone of service Tab.1.

Table 1: Classification of public spaces in Khartoum State

Service	Served population	Service zone
Neighborhood's court	500-5000	300-500M.
Residential garden	10,000-20,000	2-5 km
Communal garden	20,000-50,000	-
City Park	100,000-150,000	Bigger than 5km

Source: Author, 2014

Neighborhoods' courts in Greater Khartoum are meant to serve 500-5000 capita in buffer of 300-500m. Each plots of houses there is a court differs in its size relative to the class of the residential area. Traditionally, residential areas of Khartoum have three distinctive classes; first, second and third class. However, from general observation, neighborhoods' courts are lacking for greenery and recreational facilities for children. Recently, neighborhoods' courts became a subject of dispute between neighborhoods' residents and city planning and administration bodies. In the last few years, many neighborhoods around Khartoum State have lost completely or partial their neighborhood court as a result of re-modification of the land use or changing the purpose of neighborhood court; the thing that has sparked demonstrations led by the neighborhood residents. For the others categories of recreational spaces, it's clearly there

is a big gap in Khartoum State. Based on observation and review of relevant documents, it has been found that Khartoum State has somewhat of 40 parks, community gardens and green spaces distributed around the three cities of Khartoum State. There is a lack of reliable statistics of green spaces areas, gardens, parks and green corridors; but inhabitants of Khartoum State have not enough green spaces according to index of sufficiency of urban green spaces. Index of sufficiency of urban green spaces is the fraction of the square meters of green spaces by the number of a city's inhabitants that is often used to evaluate the sufficiency of urban green spaces is the fraction of the square meters of green spaces by the number of a city's inhabitants ( $m^2 \text{green spaces} / \text{inhabitants}$ ). Some characteristic examples of the index values for some megalopolises are: Athens=2.55, London=9.00, Vienna=20.00, Amsterdam=27.00, Bonn = 35.00, Washington = 50.00 (Tsouchlaraki et al. 2010).

In spite of this noticeable lack of green spaces, statistics gained from governmental offices showed that Khartoum State there are 224 reserved and under reserve urban forests. 190 forests reserved including *Alsunut* forest; one of the famous city forests in Khartoum state it extends in an area of 587.4 Feddan. Streets and corridors greenery is also present in Khartoum state especially along the roads in the old parts of Khartoum and Omdurman cities specifically along River Nile Fig.2. The most predominant types of trees species grown on the streets of Khartoum state are *Azadiracta indica*, *Khaya* and *Entandrophragma*, *Phoenix dactylifera* and most recently; *conocarpus laucifolius* plus different ornamental plants and bushes



Fig.2: Different green infrastructure in Study area.

Author, 2014

## 5. CONCLUSION

This study concludes that; although Khartoum State has abundance in neighborhoods courts, however, the city is severely lacking availability of green spaces. Study area has different types of green infrastructures however; it will not compensate the shortage of green spaces Khartoum State suffers from.

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